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(54) Abstract Title
Security alarm systems

(57) A Security Alarm System Controller 1 comprises input means for receiving data from at least one detector 4,5 which indicates a breach of security, output means for outputting an alarm signal, and computer network server means operable to interact between the controller and a computer network user 9 who has access to the network (e.g. Internet) 11. The computer network server means is operable to pass data relating to the status of the alarm system to the network user 9 and to re-configure the alarm system controller on the basis of instructions from the network user 9.

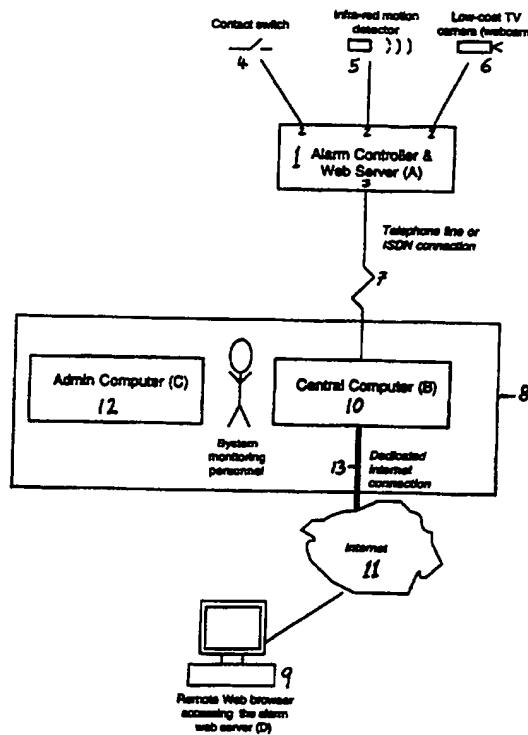


Figure 1: How the alarm controller/web server links via the Security Centre to the Internet and hence to the remote user

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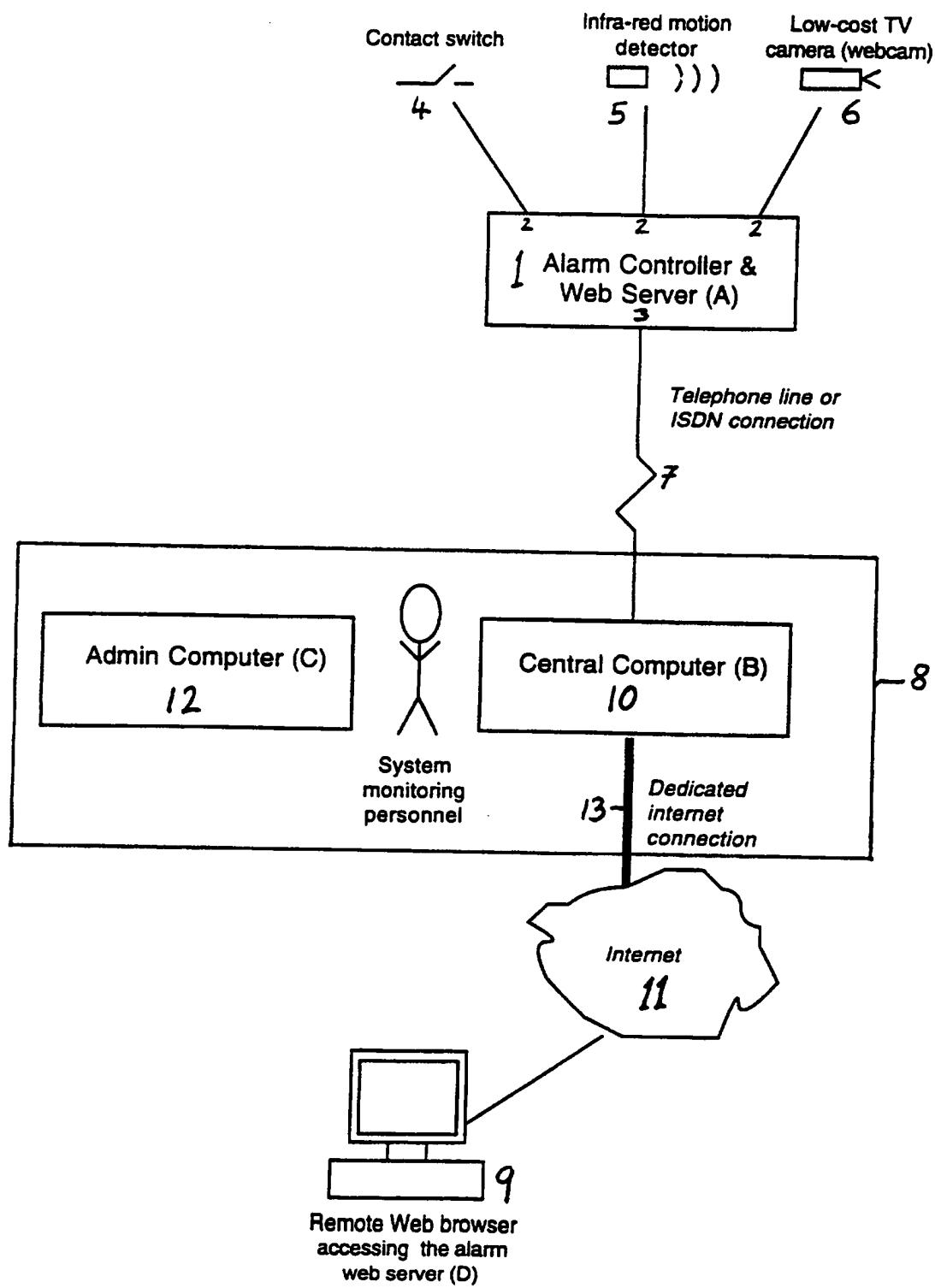


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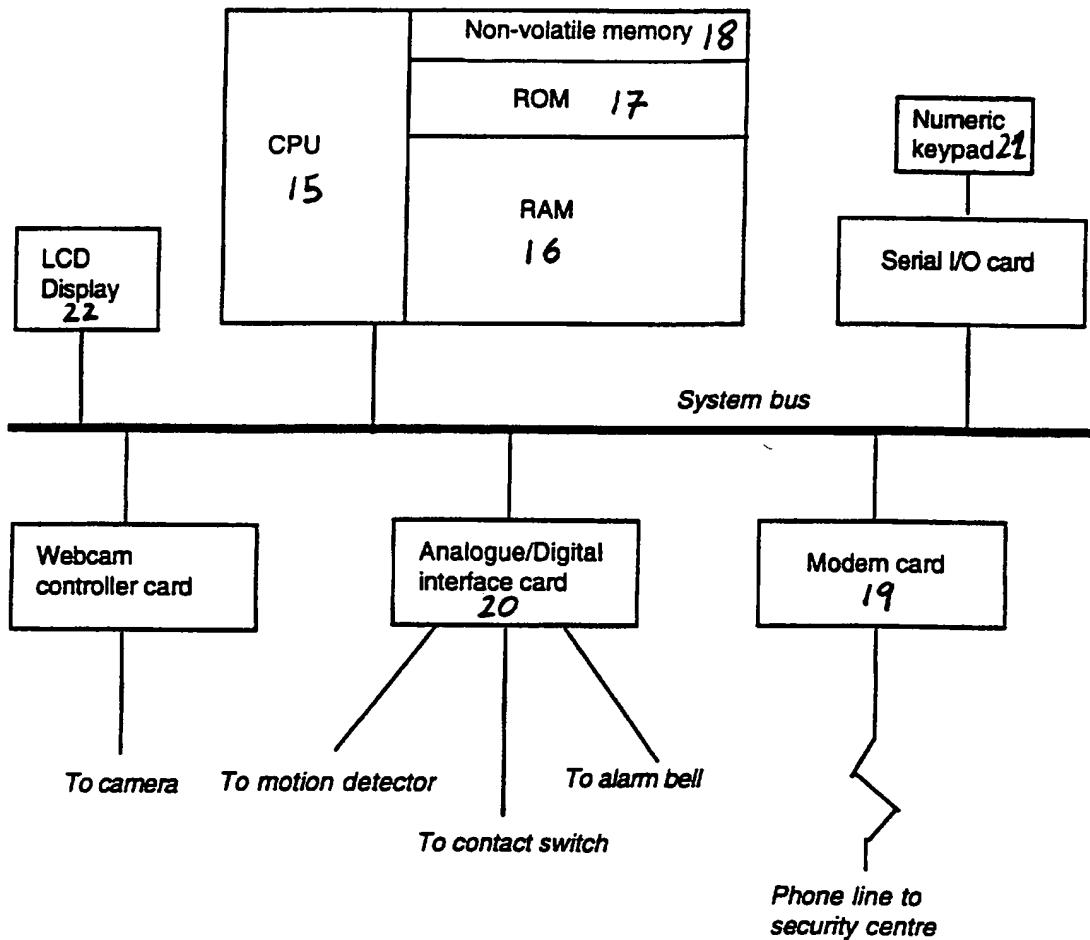


Figure 2: Main hardware components in an implementation of the controller unit

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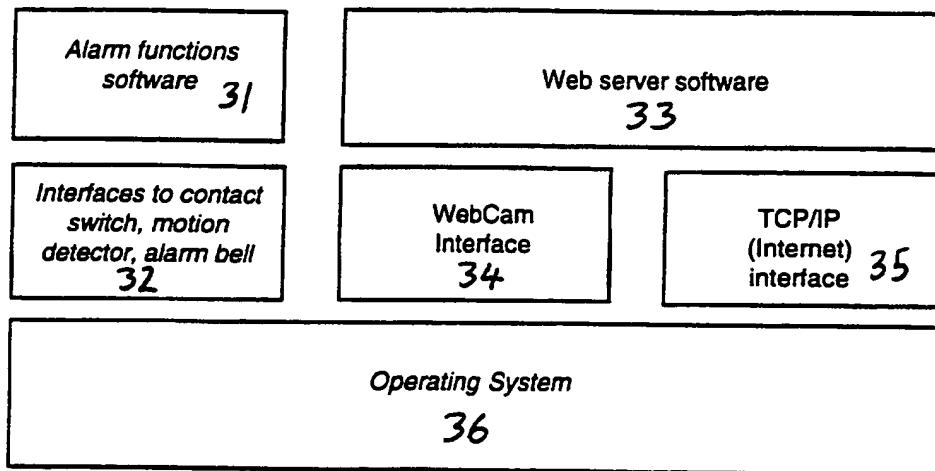


Figure 3. The main software components in the alarm controller.
The elements shown in italics are similar to those needed in a conventional alarm controller, although the operating system is likely to be more sophisticated here

**IMPROVEMENTS IN AND RELATING TO SECURITY ALARM SYSTEMS
AND THEIR CONTROLLERS**

This invention relates to security alarm systems, for example those which are used

5 to protect buildings, and to their controllers.

Existing security alarm systems comprise an alarm controller, detectors (such as door and window switches, pressure pads and movement detectors) which monitor a property, and a bell or siren which is activated by the controller when security is breached.

Many countries now have legislation which only permits the use or fitting of such an alarm
10 provided that the controller notifies a keyholder or central monitoring station of the breach
of security, and this is normally achieved by the controller having access to a telephone
line.

Once a person has left the property, it is common for that person to worry that he
or she has forgotten to set the alarm system, or to close alarmed doors which might cause
15 the bell or siren to sound or prevent the system from setting.

Hitherto, it has been necessary to telephone a neighbour or other keyholder, or perhaps the central monitoring station, to ask them to check the property. This is clearly an unsatisfactory situation which no-one has addressed, despite the problem having existed for some years.

20 Accordingly, the present invention is a security alarm system controller for controlling an alarm system, the controller comprising input means for receiving data from at least one detector which indicates a breach of security, output means for outputting an alarm signal, and computer network server means operable to interact between the security alarm controller and a computer network user who has access to the network, whereby
25 the computer network server means is operable to pass data relating to the status of the alarm system to the network user and is operable to re-configure the alarm system on the basis of instructions from the network user. The network is preferably the Internet because it can be accessed from practically everywhere. Thus, it is possible for a person to check his or her alarm system remotely via the Internet or other network in order to find
30 out whether or not it is set, and if, for example, it is found that it has not been set, the person can then set it. In addition, if the alarm detectors are arranged to protect the

property in zones, the zone configuration can be altered, for example to exclude a particular zone if an alarmed internal door has been left open. It is particularly advantageous to use a telephone line connection to gain access to the controller, partly because it is cheap, and few buildings now do not have telephone lines, and partly because 5 most controllers have access to a telephone line anyway so as to alert a central monitoring station of any breach of security. It is clearly advantageous to use the same telephone line as that used to alert the central monitoring station.

It is also advantageous if access to the controller by an Internet user is only possible if the user goes through a computer at the central monitoring station. This makes the 10 Internet web server more secure from unauthorised web users, particularly if the central monitoring station has an access authorisation system for permitting only authorised access. If the web user is not given the location of the secure property, anyone who might gain unauthorised access cannot identify the property.

Many people, especially when they are away from home for a long period, would 15 like to observe their own home to reassure them that it is safe. If the security alarm system includes one or more cameras, the image data from them can be accessed via the Internet, so that a person can see live images of his or her home. If the or each camera includes means for re-directing its position, the web server means would be able to control the re-directing means on the basis of instructions received from a web user. The re- 20 directing means might include motors for changing the angle at which the or each camera is inclined relative to a support. A person can then direct the or each camera remotely via the Internet to scan the property so that the person can see that it is secure and safe.

In another aspect of this same invention, a security alarm system comprises: a controller having input means for receiving data from at least one detector which indicates 25 a breach of security, and output means for outputting an alarm signal; a computer network server means located as part of the controller or entirely separate therefrom which is operable to interact between the security alarm controller and a computer network user who has access to the network, whereby the network server means is operable to pass data relating to the status of the alarm system to the network user, and is operable to re- 30 configure the alarm system on the basis of instructions from the network user. The preferred network is the Internet since this is accessible from all over the world. The

network server means could be located at a central monitoring station run by a security company so that a single network server means can be used to interact with many different properties having security alarms. The network server means will typically use telephone lines to communicate with individual controllers so as to receive information relating to the security of the property and to send instructions to the controllers.

Embodiments of the invention are described below, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a schematic diagram of the security alarm system and its connections;

Figure 2 is a schematic diagram showing the general arrangement of hardware components of the alarm controller; and

Figure 3 is a block diagram showing the software which controls the hardware.

Figure 1 shows a security alarm system in which an alarm controller 1 includes one or more input means 2 and an output means 3. The input means 2 are connected to various sensors or detectors which detect breaches of security of, for example, a home.

Two types of detectors are shown, a contact switch 4, which would typically be fitted to a door or window for detecting whether or not the door or window is open, and an infra-red motion detector 5 which would normally be fitted in an upper corner of a room, hall or landing for detecting movement within that room. A low-cost television camera 6 could be placed in a room, positioned so as to observe activity in that room. The camera could be positioned so as to observe garages, stables, sheds or even the outside of a house. This is also connected to the input means 2. Other types of detectors could also be used, but the contact switch detector 4 and the infra-red motion detector 5 are particularly favoured detectors since they are relatively cheap and effective. The television camera 6 is also very good, but tends to be more expensive. The detectors produce detector data which is fed into the input means 2 of the controller 1, and the data from the television camera 6 is in the form of image data. The detectors are normally connected to the input means 2 by cables, but might be cordless detectors which send their data to the controller by radio waves or other cordless methods.

The output means 3 includes a telephone line or ISDN link 7. If a breach of security is detected by a detector, the alarm controller 1 accesses the line 7 and notifies a central monitoring station 8 where personnel are warned of the breach. The personnel

may then take appropriate action, for example sending a security guard to the home to investigate, and possibly calling the police to the home.

The alarm controller 1 also includes Internet web server means in addition to the part of the alarm which monitors the detectors and contacts the central monitoring station

- 5 8. This enables a person to access the controller 1 from a remote Internet web terminal
9. In this embodiment, the Internet connection to the controller 1 is achieved using the same telephone or ISDN connection 7 as above. Thus the Internet user must access the controller 1 through a computer 10 at the central monitoring station 8. The computer 10 includes means for controlling the access of an Internet user to the controller 1. Thus,
- 10 before an Internet user gains access to the controller 1, it is necessary for him to identify himself as an authorised person. Anyone who gains access to the controller 1 from the Internet 11 does not receive any information as to the location of the home since, in the unlikely event that an unauthorised person gained access, they could de-activate all or part of the alarm system. The information as to the location of the home is kept on a second,
- 15 separate computer 12 which only the personnel at the central monitoring station 8 have access to.

The computer 10 has a dedicated connection 13 to the Internet 11, and the Internet user is able to access the computer 10 simply using a standard computer with web browsing software, for example Netscape Navigator (Trade Mark) or Microsoft Internet Explorer (Trade Mark). The computer may be a standard desktop P.C. or other consumer electronics device with Internet access, such as an adapted television, for example WebTV (Trade Mark). Such a unit might be found in homes, offices or hotel rooms. A user could even use a portable computer coupled with a mobile telephone.

The security alarm system controller 1 is microcomputer based and runs an operating system which is capable of running web server software. Referring to Figure 2, the controller 1 includes a microprocessor 15, Random Access Memory (RAM) 16, Read-Only Memory (ROM) 17, and a small amount of battery-backed-up or non-volatile "flash" memory 18 which would hold configurations and password information even if power were lost for an extended period. A modem 19 is included for communicating with the computer 10 of the central monitoring station 8, and interface circuitry 20 for connecting the controller 1 to the alarm circuit contact switch 4, infra-red detectors 5,

cameras 6 and an alarm bell (not shown) and to any supplementary devices connected to the controller. A screen and keyboard would not normally be necessary, but instead a simple keypad interface 21 device might be used to enter a security code when enabling or disabling the alarm, and an LCD display (or indicator lights) 22 which show the state
5 of the system.

Figure 3 shows the main software elements required, including alarm function software 31 which handles the enabling and disabling of the alarm, the monitoring of the detectors, and the triggering of the alarm bell (and alerting the central monitoring station) when an incident occurs. Interface software 32 enables the processor to detect changes
10 of state the detectors and the camera and also controls the alarm bell or siren. Web server software 33 displays the state of the alarm controller 1 in the form of web "pages" to the user and also allows the user, to change settings, such as whether the alarm, or just a circuit of the alarm, is enabled or disabled. It also displays the image data from the or each camera 6 as pictures, possibly held as JPEG type images within the web pages.
15 Camera interface software 34 permits the receiving of image data from the camera or cameras 6 and the storing of the image data as JPEG images ready for the web server software 33. TCP/IP interface software Internet 35 permits the controller 1 communicate with the central monitoring station, and with a remote web user. The operating system 36 should be a real time operating system such as OS/9 (Trade Mark),
20 and the web server software 33 can be based on commercially available products such as Spyglass Micro Server (Trade Mark). The operating system 36, the web server software 33 and the control software for the alarm system would typically be held in the ROM 17, but might be held on disk.

If a detector such as a contact switch or an infra-red motion detector detects a
25 breach of the security of the home, the controller 1 will receive this information in the form of an alarm signal. The controller 1 then raises the alarm, usually by setting off a bell or siren which alerts neighbours and passers-by, and should scare away any person attempting to enter the house. In addition, in some places, legislation demands that home security alarms should make a keyholder aware of the alarm when it has been set off. This is often
30 done by a central monitoring station 8 which is connected to the alarm controller by the telephone line or ISDN connection 7.

The operation of the security alarm system will now be described by reference, in particular to Figure 1, but also to Figures 2 and 3.

When a person leaves his home, he will set the security alarm, but it is common that such a person, once he has travelled some distance from his home will not be able to 5 remember whether or not he has actually set the alarm or not. In addition, he might be also be worried that he has not secured the property, for example, closing all of the doors and windows. By using this invention, the person can use any Internet web terminal such as a P.C. as described above, to contact the central monitoring station 8. Once he has access to the computer 10 of the central monitoring station 8, he must identify himself as 10 a person authorised to access the alarm controller 1. This may be done by passwords or other systems of authorisation. The computer 10 of the central monitoring station 8 establishes a secure link or "socket" with the remote web terminal 9, i.e. A encrypted link, and this can also be used to verify the identify of the user. A second verification stage might also be built into the alarm controller 1. All data passed between the web user's 15 terminal 9 and the controller 1 would be protected by a secure socket link so that, even after the connection has been established, it would be difficult to "hack" into the communication system between the user and the alarm system controller. The computer 10 does not include any information regarding the address of the home or its owner. This is because, in the unlikely event that an unauthorised person would gain access to the alarm 20 controller, not only might they be able to identify valuable items within the home using the television camera 6, they might also be able to disable the alarm controller prior to burgling the property. When the central monitoring station 8 dials up the controller 1, the telephone number would not be stored in the computer 10 since this could indicate the location of the property. A separate dial-out computer is therefore used which might dial only on the 25 basis of an internal identification code.

If the user correctly identifies himself and is authorised access to the alarm controller, a telephone line or ISDN connection is established between the central computer and the output means 3 of the controller 1 so that the user then has access to the webserver part of the alarm controller 1. The webserver part of the alarm controller 1 30 is arranged so as to present itself in the form of web pages. The web pages and the controller may be operated by selecting functions using a mouse or buttons, and by using

hypertext links on the pages. The Internet user can then check the status of the controller in order to check that he has properly secured the property, closing all doors and windows, and to check to see that no one has breached the security since the alarm was set. If it has been set off, the user will be able to find out the time and which circuit or zone.

5 person has not set the alarm or has not properly secured the property, he can remotely arm the alarm, or disarm certain zones of the alarm system.

In addition, where the TV camera 6 is used, the Internet user can view the images from the camera 6, thereby checking that the home is safe. This is useful where a user wishes to check that the property has not flooded or been damaged in some other way.

10 In addition where the TV camera is motorised, the web user can operate the motors in order to re-direct the direction of the cameras. Thus, the user can scan the property. Clearly, the telephone lines used to transmit data from the camera to the Internet user will not permit high quality images to be transmitted unless the scan speed is slow. However, in such a situation, this is not normally a problem. The controller could store images,

15 captured by the camera 6 if movement is detected while the alarm is set.

In addition, there are a number of options which might be available to the owner of such an alarm system. The security alarm system can monitor the temperature in a house left unoccupied during the winter so that the owner can check that if there is a likelihood of burst pipes during a sudden freeze. In addition, the alarm controller 1 might

20 also be able to control other devices such as the central heating system, the lighting in the home, and the television, so that the owner can remotely make it appear that the home is occupied.

Some homes include a video entry 'phone system, and this can be connected to the alarm controller so that when people call while the owner is out, the television images from

25 the entry 'phone can be recorded and the owner can remotely see the television images of those people who have attempted to call.

Microphones could be connected to the controller to record sounds above a certain threshold which could then be played back over the Internet to the remote user.

The system could automatically alert the Internet user, for example by a pager or

30 by dialling a mobile telephone number, of events which are suspicious but do not justify the triggering of the alarm. For example a loud noise detected by the microphone or

movement detected by the infra-red motion detector which might have an innocent explanation.

The above embodiment describes the connection of an Internet remote terminal 9 to the alarm controller 1 only via the central monitoring station 8. While, for security 5 reasons, this is clearly preferable, it is still possible in other embodiments for the remote web terminal to access the controller 1, directly from the Internet.

In the embodiments described above, reference is made to the Internet. However, while the Internet is the preferred computer network because is it accessible worldwide, other networks could be used.

10 In another embodiment (not shown) the web server is not located in the controller, but remotely therefrom. There are some advantages to locating it at the central monitoring station since a single web server can be used to access a number of controllers located at different properties. Communication between the controller and the web server can still be effected by a telephone line, and the web server can not only receive data from 15 the controller for checking if security has been breached or if the alarm has not been set, but can also instruct the controller to re-configure the system, for example by turning the alarm on or off, or where the detectors are arranged in zones, by turning particular zones on or off. Where a camera is installed, the web server can obtain images and pass them to a web user as in the earlier embodiments. Clearly, encoded telephone signals would be 20 used to prevent people hacking in the system. In addition, a user authorisation system should be used to ensure that only people who are authorised are permitted to contact a particular controller.

CLAIMS:

1. A security alarm system controller for controlling an alarm system, the controller comprising:
 - 5 input means for receiving data from at least one detector which indicates a breach of security;
 - output means for outputting an alarm signal; and
 - computer network server means operable to interact between the security alarm controller and a computer network user who has access to the network, whereby the computer network server means is operable to pass data relating to the status of the alarm system to the network user and is operable to re-configure the alarm system controller on the basis of instructions from the network user.
- 15 2. A security alarm system controller according to claim 1, wherein the computer network server means is an Internet server means.
3. A security alarm system controller according to claim 1 or 2, the controller being re-configurable to be armed (set) or disarmed.
- 20 4. A security alarm system controller according to any one of claims 1 to 3, which, when the property which is being protected by the alarm system is divided into a plurality of zones, is re-configurable to exclude or add a zone.
- 25 5. A security alarm system controller according to any previous claim, wherein the network server means includes a telephone line connection by which the network user can access the controller.
- 30 6. A security alarm system controller according to claim 5, wherein the telephone line connection also serves as the output means, or a part of the output means.

7. A security alarm system controller according to any one of previous claims, wherein the computer network server means is accessible by a network user via a remote monitoring station.

5 8. A security alarm system controller according to according to any one of the previous claims, wherein the input means is arranged to receive image data from a camera.

9. A security alarm system controller according to claim 8, further comprising a camera control output for controlling the camera.

10 10. A security alarm system comprising:
 a controller having input means for receiving data from at least one detector which indicates a breach of security, and output means for outputting an alarm signal; and
 a computer network server means located as part of the controller or entirely separate therefrom which is operable to interact between the security alarm controller and a computer network user who has access to the network, whereby the network server means is operable to pass data relating to the status of the alarm system to the network user, and is operable to re-configure the alarm system on the basis of instructions from the network user.

15 11. A security alarm system according to claim 10, wherein the computer network server means is an Internet server means.

20 12. A security alarm system according to claim 10 or 11, the controller being re-configurable to be armed (set) or disarmed.

25 13. A security alarm system according to any one of claims 10 to 12, which, when the property which is being protected by the alarm system is divided into a plurality of zones. is re-configurable to exclude or add a zone.

14. A security alarm system according to any one of claims 10 to 13, wherein the network server means includes a telephone line connection by which the network user can access the controller.
- 5 15. A security alarm system according to claim 14, wherein the telephone line connection also serves as the output means, or a part of the output means.
16. A security alarm system according to any one of claims 10 to 15, wherein the computer network server means is located, at least in part, at a remote monitoring station.
- 10 17. A security alarm system according to claim 16, wherein the controller and the server means are each able to access a telephone line for interconnection.
- 15 18. A security alarm system according to any of claims 10 to 17, further comprising a camera for supplying image data to the controller.
19. A security alarm system according to claim 18, wherein the controller further includes means for controlling the camera.
- 20 20. A security alarm system according to any one of claims 10 to 19, further comprising means for monitoring temperature conditions, at the site of the alarm controller.
21. A security alarm system according to any one of the claims 10 to 20, further comprising a video entry telephone system which supplies video data of callers to the controller.
- 25 22. A security alarm system according to any of claims 18 to 21, further comprising means for storing image data or video data.

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23. A security alarm system according to any one of claims 10 to 22, further comprising
one or more microphones for supplying audio data to the controller.

24. A security alarm system constructed and arranged substantially as herein described
5 with reference to the drawings.

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The
Patent
Office

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Claims searched: 1-24

Examiner: Mike Davis
Date of search: 22 April 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): G4H (HNHE, HNLA, HNLB)

Int Cl (Ed.6): G08B

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
	None	

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
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